The term "Green Revolution" is usually used in reference to the development and widespread adoption of high-yielding varieties of food crops in the late 1960s and early 1970s, but many Green Revolution institutions and goals still exist today. Recent reports from the [United Nations](http://worldgeography.abc-clio.com/Search/Display/1454845?terms=green%20revolution&webSiteCode=SLN_WGEO&returnToPage=%2fSearch%2fDisplay%2f1454845%3fterms%3dgreen+revolution&token=B5583518854C42FBDE31B6089A9636EA&casError=False) (UN) note that organic agriculture provides an opportunity for food security in developing nations, but this viewpoint was not always present.

Dire predictions in the 1940s and 1950s of devastating famine in developing countries led to a concerted and coordinated international effort to improve crop yields largely through technological innovation. Green Revolution research is best known for the development of high-yield crops, but research centers also investigated ways to increase cattle productivity, soil health, and management of pests, fisheries, forests, and water.

The first formal research institute devoted to the development of more productive food crops in the developing world was the [Mexico](http://worldgeography.abc-clio.com/Search/Display/1454845?terms=green%20revolution&webSiteCode=SLN_WGEO&returnToPage=%2fSearch%2fDisplay%2f1454845%3fterms%3dgreen+revolution&token=B5583518854C42FBDE31B6089A9636EA&casError=False)-Rockefeller Foundation International Agriculture Program, a joint program between the [United States](http://worldgeography.abc-clio.com/Search/Display/1454845?terms=green%20revolution&webSiteCode=SLN_WGEO&returnToPage=%2fSearch%2fDisplay%2f1454845%3fterms%3dgreen+revolution&token=B5583518854C42FBDE31B6089A9636EA&casError=False) and Mexico. The success of this early foundation led to the development of other affiliated research centers. The International Center for Tropical Agriculture (Centro Internacional de Agricultura Tropical--CIAT), established in 1967 in [Colombia](http://worldgeography.abc-clio.com/Search/Display/1454845?terms=green%20revolution&webSiteCode=SLN_WGEO&returnToPage=%2fSearch%2fDisplay%2f1454845%3fterms%3dgreen+revolution&token=B5583518854C42FBDE31B6089A9636EA&casError=False), and the International Institute of Tropical Agriculture (IITA), established in 1967 in [Nigeria](http://worldgeography.abc-clio.com/Search/Display/1454845?terms=green%20revolution&webSiteCode=SLN_WGEO&returnToPage=%2fSearch%2fDisplay%2f1454845%3fterms%3dgreen+revolution&token=B5583518854C42FBDE31B6089A9636EA&casError=False), specialized in tropical agriculture; Maize and Wheat for the Developing World (Centro Internacional de Mejoramiento de Maíz y Trigo--CIMMYT), established in Mexico in 1966, specialized in maize and wheat; and the International Rice Research Institute (IRRI), established in 1960 in the [Philippines](http://worldgeography.abc-clio.com/Search/Display/1454845?terms=green%20revolution&webSiteCode=SLN_WGEO&returnToPage=%2fSearch%2fDisplay%2f1454845%3fterms%3dgreen+revolution&token=B5583518854C42FBDE31B6089A9636EA&casError=False), specialized in rice. Each research center was originally funded by private foundations. By the mid-1960s, the Food and Agricultural Organization (FAO), the United Nations Development Program, and the [World Bank](http://worldgeography.abc-clio.com/Search/Display/1454845?terms=green%20revolution&webSiteCode=SLN_WGEO&returnToPage=%2fSearch%2fDisplay%2f1454845%3fterms%3dgreen+revolution&token=B5583518854C42FBDE31B6089A9636EA&casError=False)were called on to help raise money to support the research centers. Representatives from each of the international development groups recognized a need for coordinated research on agriculture. As a result, the Consultative Group on International Agricultural Research (CGIAR) was established in 1971. CGIAR added research center locations in [India](http://worldgeography.abc-clio.com/Search/Display/1454845?terms=green%20revolution&webSiteCode=SLN_WGEO&returnToPage=%2fSearch%2fDisplay%2f1454845%3fterms%3dgreen+revolution&token=B5583518854C42FBDE31B6089A9636EA&casError=False),[Peru](http://worldgeography.abc-clio.com/Search/Display/1454845?terms=green%20revolution&webSiteCode=SLN_WGEO&returnToPage=%2fSearch%2fDisplay%2f1454845%3fterms%3dgreen+revolution&token=B5583518854C42FBDE31B6089A9636EA&casError=False), [Kenya](http://worldgeography.abc-clio.com/Search/Display/1454845?terms=green%20revolution&webSiteCode=SLN_WGEO&returnToPage=%2fSearch%2fDisplay%2f1454845%3fterms%3dgreen+revolution&token=B5583518854C42FBDE31B6089A9636EA&casError=False), the United States, [Ethiopia](http://worldgeography.abc-clio.com/Search/Display/1454845?terms=green%20revolution&webSiteCode=SLN_WGEO&returnToPage=%2fSearch%2fDisplay%2f1454845%3fterms%3dgreen+revolution&token=B5583518854C42FBDE31B6089A9636EA&casError=False), [Italy](http://worldgeography.abc-clio.com/Search/Display/1454845?terms=green%20revolution&webSiteCode=SLN_WGEO&returnToPage=%2fSearch%2fDisplay%2f1454845%3fterms%3dgreen+revolution&token=B5583518854C42FBDE31B6089A9636EA&casError=False), the Ivory Coast, [Syria](http://worldgeography.abc-clio.com/Search/Display/1454845?terms=green%20revolution&webSiteCode=SLN_WGEO&returnToPage=%2fSearch%2fDisplay%2f1454845%3fterms%3dgreen+revolution&token=B5583518854C42FBDE31B6089A9636EA&casError=False), the [Netherlands](http://worldgeography.abc-clio.com/Search/Display/1454845?terms=green%20revolution&webSiteCode=SLN_WGEO&returnToPage=%2fSearch%2fDisplay%2f1454845%3fterms%3dgreen+revolution&token=B5583518854C42FBDE31B6089A9636EA&casError=False), [Sri Lanka](http://worldgeography.abc-clio.com/Search/Display/1454845?terms=green%20revolution&webSiteCode=SLN_WGEO&returnToPage=%2fSearch%2fDisplay%2f1454845%3fterms%3dgreen+revolution&token=B5583518854C42FBDE31B6089A9636EA&casError=False), [France](http://worldgeography.abc-clio.com/Search/Display/1454845?terms=green%20revolution&webSiteCode=SLN_WGEO&returnToPage=%2fSearch%2fDisplay%2f1454845%3fterms%3dgreen+revolution&token=B5583518854C42FBDE31B6089A9636EA&casError=False), and[Indonesia](http://worldgeography.abc-clio.com/Search/Display/1454845?terms=green%20revolution&webSiteCode=SLN_WGEO&returnToPage=%2fSearch%2fDisplay%2f1454845%3fterms%3dgreen+revolution&token=B5583518854C42FBDE31B6089A9636EA&casError=False). CGIAR is currently the leader in coordination of international agricultural research, but many countries also operate affiliated or independent agricultural research programs.

Green Revolution goals have changed over time. The early emphasis in agricultural research centers was to increase food production. In the 1980s, a need for sustainable food production was recognized. By the 1990s, growing concerns about inequality in Green Revolution technology distribution and benefits led to a greater effort to link agricultural research goals to specific national development programs specifically designed to benefit those most in need. Today the official priorities of CGIAR are "reducing hunger and malnutrition by producing more and better food through genetic improvement, sustaining agriculture biodiversity both in situ and ex situ, promoting opportunities for economic development and through agricultural diversification and high-value commodities and products, ensuring sustainable management and conservation of water, land and forests, and improving policies and facilitating institutional innovation."

The first intensively studied Green Revolution crops were wheat and rice; in large part because the more developed countries in the 1940s and 1950s had experience in growing these crops. Research on several other tropical food crops like maize, cassava, chickpea, sorghum, potato, and millet soon followed, but progress was slower because the crops had not been scientifically studied as intensively as had wheat and rice. By the year 2000, CGIAR had developed over 8,000 different varieties of 11 different crops. Higher-yielding crops are most commonly created by breeding dwarf varieties. In a dwarf plant more energy is devoted to producing edible material and less energy is expended on growing inedible materials like stalks and husks.

In practice, adoption of Green Revolution high-yielding seeds was accompanied by increased inputs in synthetic fertilizers, pesticides, tractors, and irrigation systems. The first adoption of a Green Revolution crop was wheat in the 1950s in Mexico. Within a few years Mexico was self-sufficient in wheat and the program was deemed a success. Lessons and crops from Mexico were quickly transferred to India, a country that many at the time thought was on the brink of severe famine. Green Revolution technology was given much of the credit for averting the famine. The transfer of Green Revolution technology has had varied rates of success. Green Revolution success was initially limited in [Sub-Saharan Africa](http://worldgeography.abc-clio.com/Search/Display/1454845?terms=green%20revolution&webSiteCode=SLN_WGEO&returnToPage=%2fSearch%2fDisplay%2f1454845%3fterms%3dgreen+revolution&token=B5583518854C42FBDE31B6089A9636EA&casError=False) in the 1960s and 1970s. High-yielding varieties of seeds, proven successful in [Latin America](http://worldgeography.abc-clio.com/Search/Display/1454845?terms=green%20revolution&webSiteCode=SLN_WGEO&returnToPage=%2fSearch%2fDisplay%2f1454845%3fterms%3dgreen+revolution&token=B5583518854C42FBDE31B6089A9636EA&casError=False) and [Asia](http://worldgeography.abc-clio.com/Search/Display/1454845?terms=green%20revolution&webSiteCode=SLN_WGEO&returnToPage=%2fSearch%2fDisplay%2f1454845%3fterms%3dgreen+revolution&token=B5583518854C42FBDE31B6089A9636EA&casError=False), were quickly introduced to [Africa](http://worldgeography.abc-clio.com/Search/Display/1454845?terms=green%20revolution&webSiteCode=SLN_WGEO&returnToPage=%2fSearch%2fDisplay%2f1454845%3fterms%3dgreen+revolution&token=B5583518854C42FBDE31B6089A9636EA&casError=False), but were not adapted to the local ecological or social context until the end of the 1980s.

Promotion of organic agriculture was clearly not a part of the Green Revolution technology package of the 1960s and 1970s. The Green Revolution is largely responsible for ending organic agricultural practice in the developing world with the introduction of synthetic fertilizers and pesticides. However, the recent movement towards long-term sustainability of environmental health has been termed the "second green revolution." Some of the same research centers that were at the forefront of the first Green Revolution are now leaders in developing agricultural systems that are environmentally, socially, and economically sustainable.

The impact of the Green Revolution for promotion of local foods is more mixed than for organic production. One of the goals of the Green Revolution was to increase local self-sufficiency in food production. If higher-yielding agricultural systems could be adapted to many different ecosystems, in particular to tropical areas, those places would be less reliant on food aid. Nonetheless, the overall goal was to increase the total stock of food. Green Revolution research focused on places and conditions in particular countries that would maximize total gains. Most crop varieties have been specifically designed to grow best in places with reliable rainfall or irrigation systems, not for areas that have only marginal agricultural potential. Therefore, some of the poorest farmers in the world have not seen much benefit from Green Revolution technology, and improvement in local food production is not equally distributed to all agricultural areas. Additionally, exogenous inputs are compulsory for farmers that adopt Green Revolution agricultural systems. Seeds, fertilizers, pesticides, and tractors are all developed and sold by outsiders. If a Green Revolution variety is adopted, then cultivation of other crops that had previously been grown in the area must be abandoned. Local agricultural systems that had been in place before the Green Revolution were at least transformed and sometimes completely dismantled. Higher yields were accompanied by higher costs, so some farmers had to export foods to wealthier markets to maximize profits.

In some ways the Green Revolution was very much in line with the concept of sustainability. The key goal of the Green Revolution was to sustain food supplies for the entire population of the world. But, the alluring promise of improved yields and greater profits led in some cases to expanded cultivation into areas that were not well suited to Green Revolution technology, and more intensive cultivation can have negative consequences for the natural environment.

Although Green Revolution agricultural research centers have developed thousands of seed varieties, the biodiversity of agricultural crops has declined since the 1940s. The adoption of Green Revolution crops meant the abandonment of other crops, and in some cases local varieties of plants ceased to be cultivated and are now extinct. A lack of both species diversity and genetic diversity reduces long-term sustainability through an increase in vulnerability to crop failure due to plant disease and climate extremes.

Investment in Green Revolution technology was expensive but had potential for significant profit. Only the wealthiest landowners were able to afford Green Revolution inputs. Farmland was consolidated when land from poorer farmers with small land holdings was purchased by wealthier farmers. Wealthy farmers were able to increase their wealth. Poorer farmers either moved to more marginal land to try to farm, which can lead to increased degradation in those marginal areas, worked as farm laborers, or moved away, often to urban areas. Landless farm laborers benefited from wage increases when Green Revolution technology raised profits, but laborers generally did not benefit as much as landowners.

The long-term impacts of the Green Revolution for sustainability are varied. The intensive, high-energy inputs associated with the Green Revolution can clearly degrade soil quality, decrease biodiversity, and increase social inequality. Yet, proponents of the Green Revolution argue that overall the goal of preventing widespread famine has been achieved. In truth, the Green Revolution has never ended and currently greater attention is now paid to enhancing many different facets of sustainability beyond tons of grain produced.